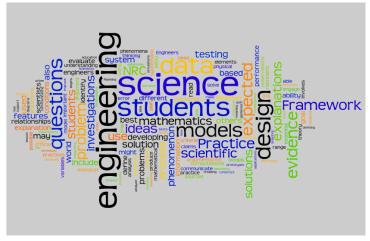
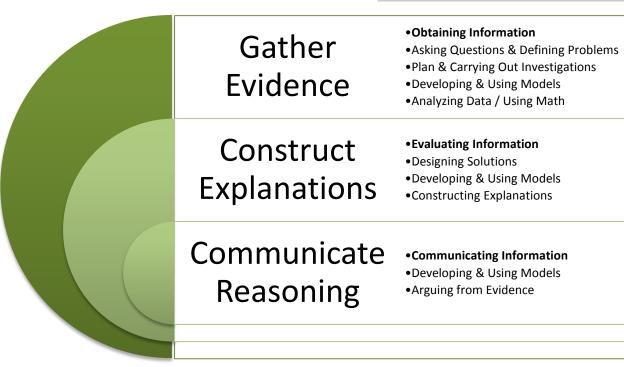
# Key Perspectives to Keep in Mind

- What do the practices look like in High School?
- What do the practices look like in postsecondary education?
- How are the practices used in a career setting?
- How do the practices factor into life-long learning?





# **Group Performance**

Investigate how the size and/or relative size of a balloon inflated in one breath.

- 1. Explore have each member blow up a balloon in one breath, then compare the size of the balloons.
- 2. Write down 3 **questions** about the balloon sizes and/or relative balloon size.
- 3. Develop and evaluate **evidence** to support your **explanations**.

#### **Individual Performance**

4. Write an <u>explanation</u> that may be used to explain this phenomenon to others. Include the <u>evidence</u> to support your <u>explanation</u> for balloon size and/or relative balloon size.

#### Reflection

5. Reflect on the nature of science and how you develop **explanations** based upon **evidence**.

# On your paper:

1.	What does this practice <b>mean</b> ? In your own words.
2.	How was this practice <b>used</b> in the activity?
3.	What <b>instructional strategies</b> would you use as a facilitator to support participants in using this practice?
4.	What <b>visual model</b> would help you to communicate this practice?
Using a topic you are teaching this month:	
1.	Can you use this model to engage students with material?
2.	For the content you have selected, which of the 8 practices would students engage in?
3.	How would each of the practices you identified be used by students in your lesson/unit?

## **Grade 12 Goals for Each Practice**

Taken from *A Framework for K-12 Science Education* pages 54 – 77. The Framework is available for free as a PDF at http://www.nap.edu/catalog.php?record\_id=13165#

## **Asking Questions and Defining Problems**

Goals by Grade 12:

- Ask guestions about natural and human built worlds
- Distinguish a scientific from nonscientific question
- Formulate and refine questions that can be answered empirically
- Ask probing questions
- Note features, patterns or contradictions and ask questions about them
- Engineering Ask questions about a need or desire

#### **Developing and Using Models**

Goals by Grade 12:

Construct drawings or diagrams use them as the basis of explanations and predictions

- Represent and explain phenomenon with models
- Discuss the limitations and precision of a model and refine models to improve their quality and explanatory power.
- Use simulations as a tool for understanding and investigating aspects of a system
- Make and use a model to test a design and compare effectiveness of different designs

### **Planning and Carrying Out Investigations**

Goals by Grade 12:

- Formulate a question that can be and frame a hypothesis based on a model or theory
- Decide what data to gathered, what tools are needed, and how to record measurements
- Decide how much data is required for reliable measurements and consider any limitations on the precision of the data
- Plan procedures, identifying relevant independent and dependent variables and the need for controls
- Consider possible confounding variables

#### **Analyzing and Interpreting Data**

Goals by Grade 12:

- Analyze data to look for patterns or test a hypothesis
- Collate, summarize and display data in order to explore relationships between variables
- Evaluate the strength of conclusions that can be inferred from a data set using appropriate math or statistics
- Recognize patterns in data and distinguish between causal and correlational relationships
- Collect data from physical models and analyze performance of designs under a range of conditions

#### **Using Mathematics and Computational Thinking**

Goals by Grade 12:

- Recognize dimensional quantitates and use appropriate units in scientific applications of mathematical formulas and graphs
- Express relationships and quantities forms
- Recognize mathematical models that incorporate underlying assumptions about the phenomena or systems being studied
- Use simple test cases of mathematical expressions, computer programs, or simulations to see if they "make sense"
- · Use grade-level-appropriate understanding of mathematics and statistics in analyzing data

#### **Constructing Explanations and Designing Solutions**

Goals by Grade 12:

- · Construct explanations of phenomena using scientific theory and link to models and evidence
- Use primary or secondary scientific evidence and models to support or refute an explanatory account of a phenomenon
- Offer causal explanations and solve design problemsIdentify gaps or weaknesses in explanatory accounts and evaluate and critique design solutions
- Design a plan that meets specified criteria to solve a problem
- · Construct a device or implement a design solution

#### **Engaging in Argument from Evidence**

Goals by Grade 12:

- Construct a scientific argument with data to support a claim and recognize the features of scientific arguments and distinguish between claims, data and reasons in examples
- Identify weaknesses and flaws in arguments using evidence, modify and improve arguments in response to criticism and read media reports critically to identify strengths and weaknesses
- Explain the controversy in the development of a scientific idea, describe debate that surround it, and why one theory succeeded
- Explain how claims are judged, articulate merits and limitations of peer review and need for replication of investigations

# Obtaining, Evaluating and Communicating Information

Goals by Grade 12:

- Use words, tables, diagrams, graphs and mathematical expressions to communicate understanding or to ask questions
- Read scientific and engineering text, including tables, diagrams, and graphs and explain the key ideas being communicated
- Recognize the major features of scientific and engineering writing and speaking and produce written and illustrated text or oral presentations that communicate their own ideas
- Engage in a critical reading of primary scientific literature or media reports and discuss the validity and reliability